

**Original Article****Institutional Finance and FinTech Adoption in Agri-Business Enterprises: A Study of Bengaluru Rural District****Dr. Mohan Kumar D**

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Abstract

The availability of credible and affordable finance has remained one of the most nagging problems of agri-business enterprises in India. Although institutional financing mechanisms are present in form of banks, cooperatives, and credit schemes supported by government, numerous startups still encounter challenges in the form of collateral requirements, prolonged processes, and poor credit assessment procedures (NABARD, 2022). The recent accelerated development of financial technology (FinTech) offers new possibilities to fill these gaps by providing digital credit, payment, and supply-chain financing services, especially in rural areas, where the traditional banking system is not fully deployed.

This paper evaluates the institutional finance and the levels of the adoption of FinTech by agri-business enterprises in Bengaluru Rural District. The research questions will be to determine the availability of institutional finance, the degree of FinTech adoption, and the connection between the availability of finance and technology-based solutions. It is suggested to adopt a mixed-method approach, which will include survey data of agri-business enterprises and interviews of institutional finance providers. Patterns and determinants of adoption will be compared by means of descriptive statistics, correlation, and regression analysis.

The results indicate that institutional finance may continue to play a central role but FinTech tools can have a positive impact on the access to credit, lower the transaction cost and enhance operational efficiency in the agri-businesses. The policy implications emphasize that the joint models are needed to combine the traditional finance with the digital innovations to enhance the rural enterprise ecosystem.

Keywords: institutional finance, FinTech adoption, agri-business enterprises, rural economy, Bengaluru Rural District.

Introduction

Agriculture and its related industries is a very important backbone to the Indian economy not only in the aspect of providing food security but also by providing a good number of Indians in the rural area with employment. Agri-business enterprises, which include the suppliers and processors of inputs, logistical and marketing firms, are a critical part of this framework since they facilitate the connection between farmers and markets. The expansion and survival of these businesses, however, strongly rely on the availability of stable and cheap finance. Institutional finance, which is availed in the form of the commercial banks, cooperative banks and development finance institutions, is still a very important source of capital to agri-business operations. However, several policy measures and specific credit programs have not helped numerous businesses to receive sufficient funding. Small and medium agri-business enterprises are usually deterred to fully deal with formal financial institutions due to high collateral requirements, bureaucratic loan application processes, and slow disbursements (RBI, 2021; NABARD, 2022).

However, financial technology (FinTech) has become a possible game-changer in rural credit gaps in the past few years. FinTech solutions, in the form of mobile banking, digital payments, peer lending sites, and credit scoring based on data, are financially more affordable and quicker and inclusive. The tools are especially applied in the rural businesses that have issues with physical banking infrastructure. Being able to utilize digital platforms, FinTech can enhance financial inclusion as well as decrease the amount of transaction costs and improve the transparency of credit delivery (Arner, Barberis, & Buckley, 2016; Gomber, Koch, & Siering, 2017).

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Increasing adoption of FinTech in the agricultural sector is also in line with the national programs that foster digital transactions and financial literacy in rural areas.

Bengaluru Rural District has been chosen as the target of this study because of its timeliness and relevance. The district is situated near the metropolitan center of Bengaluru and it is a distinct example of semi-urban and rural economy. Agriculture has been a major source of livelihood, but small-scale processing units, farmer producer organizations (FPOs), and agri related service business have also increased in the region. It is also close to Bengaluru, which has access to technological innovations but large parts of its rural economy have structural issues with accessing institutional finance. The intersection of traditional finance and adoption of FinTech in the agri-business enterprise is a perfect location to be discussed in the district.

Although there is a growing body of literature on the topic of digital finance and rural development, a gap in terms of empirical research related to the topic of institutional finance and FinTech as a co-determining factor in the development of agri-business businesses on a district scale is quite evident. Current sources usually dwell upon either agricultural credit or on the digital adoption in general, without analyzing their interaction in a particular local environment (Kumar, 2020; Mishra and Sahoo, 2021). This research aims to fill this gap by examining the availability of institutional finance, as well as the level and factors of FinTech adoption in Bengaluru Rural District among enterprises.

Based on this, the research questions that the study follows are as follows:

- What is the state of the institutional finance to agri-business enterprises in Bengaluru Rural District?
- What is the level of adoption of FinTech tools by these enterprises?
- What are the drivers to the adoption of FinTech in the agri-business sector?
- What would be the improvement of financial access and efficiency of rural enterprises by the integration of institutional finance and FinTech?

The research will also help in filling the gaps in academic literature and policy debates in enhancing financial systems that will help in promoting agri-business ventures in the rural setting of India.

Review of Literature

2.1. Institutional Finance in Agri-Business

The role of institutional finance as the lifeline of the agricultural and agri-business activities is not a new development. Commercial banks, cooperative banks, and specialized institutions like the NABARD have been used as the main players in the provision of credit to the farmers, the processors and small-scale enterprises. These financial institutions also offer working capital, investment loans, input purchase credit which is paramount in supporting production and marketing (RBI, 2021). In rural zones, cooperative credit systems, especially Primary Agricultural Credit Societies (PACS), are still crucial, since they are more available to small businesses than the big commercial banks (Chand, 2017). The microfinance institutions have also become significant in the provision of small ticket loans to rural entrepreneurs, where the formal banking institutions cannot reach (Armendariz & Morduch, 2010).

In the case of agri-business ventures, institutional finance does not just facilitate investments in production related activities, but also storage, processing, and supply-chain management innovations. Reports have revealed that availability of credit at the right time boosts the growth of the enterprise, employment in the rural areas and market connections between farmers and their markets (Basu and Srivastava, 2005). However, institutional financing remains underwhelming with regard to keeping up with the changing demands of agri-business enterprises despite policy support.

2.2. Barriers to Finance for Agri-Enterprises

Although institutional finance is there, it is frequently hampered by obstacles to its successful use. The need to have collateral security is one of the leading challenges since most of the small and medium agri-enterprises are unable to secure it. The process is complicated further by credit risk perceptions and information asymmetries between the lenders and the borrowers (Stiglitz and Weiss, 1981). The time-consuming nature of loan processing, inflexible repayment schedules, and the voluminous cost of transactions are some of the factors that deterring factors to obtain formal credit among enterprises (Bell, 2015).

The other hindrance is the poor customization of financial products to the special requirements of agri-businesses. The agriculture-related businesses, unlike the traditional industries, have to experience the seasonal fluctuations, weather uncertainties and unstable market prices. Standardized loan products can not always take these realities into account, and many businesses have no choice but to rely on informal sources of credit, which might be higher and more exploitative (Kale & Bhattacharya, 2017). As a result, credit gap is high thus limiting innovation and growth of agri-business sector.

2.3. FinTech in Agriculture

Financial technology (FinTech) has also brought about new opportunities in the way these barriers can be overcome. Applications of loans, payments, and even credit scores are being done digitally. Mobile banking and payment systems have enhanced accessibility by rural entrepreneurs who are able to make payments and transactions without visiting the physical banks (Donovan, 2012). Alternative data-based credit scoring models, including mobile phone utilization trends, transaction history, and satellite imaging of crops, are changing the risk assessment and enabling much more inclusive lending (Fuster et al., 2019).

Agricultural supply chains are also experimenting with emerging technologies, including blockchain, which has the potential to enhance the supply chain in terms of transparency, traceability, and financing and transaction efficiency (Tripoli and Schmidhuber, 2018). Digital financial inclusion platforms and systems such as UPI and Aadhaar-enabled payment systems have been created in India; government-led efforts such as the digitization of Kisan Credit Card are designed to bring farmers and agri-enterprises further into the reach of formal finance (NITI Aayog, 2021).

2.4. Empirical Evidence on FinTech Adoption in Rural and Agri Contexts

Empirical research on the adoption of FinTech can indicate that there is a slow but encouraging pattern in rural and agricultural settings. Mobile money services like M-Pesa have in Sub Saharan Africa.

illustrated the capacity of digital finance to change the economy of rural areas through less reliance on cash and informal lenders (Jack and Suri, 2014). In China, the same has been the case, where e-commerce platforms such as Rural Taobao by Alibaba have granted market access as well as financial services to rural households (Zhang, 2019).

Research in the Indian context has also revealed that mobile banking and digital payments can be used to improve financial inclusion especially in rural regions (Kumar, 2020). It has been found that smallholder farmers and businesses are more and more using FinTech in making payments, savings, and credit, although the adoption rate is not evenly distributed because of the digital literacy, infrastructure, and trust gaps (Mishra and Sahoo, 2021). These results demonstrate that FinTech is a two-sided phenomenon in rural India: it has a huge potential, but issues concerning the lack of awareness, technology accessibility, and institutional support should be eliminated.

2.5. Gap Identification and Contribution of the Study

Although the body of work on institutional finance is quite extensive and a growing amount of research is available regarding the role of FinTech in rural development, there is little research that specifically investigates the intersection between the two in the context of agri-business enterprises. The bulk of research is either based on the provision of agricultural credit or the issue of digital finance adoption as a whole without examining the interaction between the two issues on the enterprise level in a localized environment (Singh & Shetty, 2020). Additionally, there are only a few district-level studies which portray the semi-urban-rural interface e.g. in Bengaluru Rural District.

This research paper fills these gaps of literature. It examines the place of institutional finance and at the same time evaluates the uptake of FinTech solutions by agri-business enterprises. The research locates itself in Bengaluru Rural District, which puts it in a technology-proximate context to an urban center but still faces rural credit issues. Findings of the study should be used in both policy formulation and financial planning on how to enhance the agri-business enterprises using a hybrid approach of institutional and digital finance.

3. Research Objectives and Hypotheses

The needs of agri-business enterprises in financing are more complicated and influenced by the structural and changing market opportunities. The conventional institutional finance has remained a pillar in the development of enterprises, but the accelerated proliferation of financial technology has produced new routes to enhancing access and efficiency. It is against this background that the current study will be based on four objectives:

1. To explore the issue of how institutional finance can aid with agri-business ventures in Bengaluru Rural District.
2. To examine the level of FinTech in agri-business enterprises.
3. To determine the linkage between institutional finance access and adoption of FinTech.
4. To assess the difficulties and possibilities of incorporating the FinTech in traditional institutional finance.

In order to experimentally investigate these aims, the research comes up with the following hypotheses:

- H1: The availability of institutional finance has a positive impact on the adoption of FinTech by agri-business companies.
- H2: The adoption of FinTech enhances access to and efficiency of financial services to agri-business enterprises.
- H3: There are socio-economic and enterprise-specific factors that influence FinTech adoption.

These hypotheses are supported by previous evidence pointing to the fact that institutional support may serve as a catalyst in the digital finance uptake (Arner, Barberis, and Buckley, 2016; Mishra and Sahoo, 2021). They are also associated with the increasing awareness that FinTech has the potential to decrease the information asymmetry and transaction costs and provide more customized services to rural businesses (Fuster, Plosser, Schnabl, and Vickery, 2019). The study aims at offering some context-sensitive information by testing these linkages within the context of Bengaluru Rural District that can help not only in policy discussion and debate, but also in the academic discussion.

Research Methodology

4.1. Study Area: Bengaluru Rural District

The research is carried out in Bengaluru Rural District, Karnataka which is a peculiar fusion of rural and semi-urban forces. The district is located near the metropolitan city Bengaluru and is mainly agrarian with the economies being sustained by horticulture, dairy, sericulture and small scale processing units. Farmer producer organizations (FPOs), small- and medium-enterprises (SMEs), and agri-service providers became the newcomers in recent years.

important customers of the local economy. Although it lies close to Bengaluru, the so-called technology hub in India, the institutional finance access and the use of digital financial technologies in this district is not even spread. It is in this way that Bengaluru Rural is suitable in analyzing the relationship between institutional finance and FinTech solutions in the support of agri-business enterprises.

4.2. Research Design

Research design used in the study is descriptive and analytical in nature. The descriptive element is applied to capture demographic and business portraits of businesses, how they access financial opportunities and how they use FinTech technologies at present. The analytical part will make an assessment of the correlation between institutional finance, FinTech adoption, and enterprise-level factors. Such a design will allow both the what (patterns and trends) and the why (causal relationships) of the research problem to be sufficiently covered (Kothari, 2004).

4.3. Sampling

The sample population of this study will be agri-business enterprises that are located in Bengaluru Rural District, which comprise farmer producer organizations, agro-processing SMEs, and agri-service providers. A stratified random sampling method is used to achieve representation of the various categories of enterprises whereas purposive sampling method is implemented to sample respondents of institutions like banks and FinTech providers to provide qualitative data. The sample size will be determined at about 150-200 enterprises, which will suffice both the descriptive statistics and the multivariate analysis, and will be a statistically valid sample with the time-resource limitations typical of a conference study (Hair, Black, Babin, and Anderson, 2010).

4.4. Data Sources

The research is based on the primary and secondary data.

- Primary Data: Structured instruments will be used to examine the financing behavior of owners and managers of agri-business enterprises through questionnaires that will include their perceptions of barriers and opportunities, the levels of adoption of FinTech and their financing practices. The representatives of the banks, cooperative institutions and FinTech service providers are also interviewed using semi-structured questions to complement the enterprise-level data with the institutional positions.
- Secondary Data: The supporting information will be taken as published reports of Reserve Bank of India (RBI), National Bank of Agriculture and Rural Development (NABARD), Ministry of Agriculture and Farmers Welfare, World bank studies on rural finance, and other related policy documents.

4.5. Variables and Constructs

The constructs of interest to be investigated are the following:

1. Availability of Institutional Finance - gauged against the presence of loans, sufficiency, security demand, and promptness of the loan.
2. FinTech Adoption Level - measured using the level of mobile banking, online payment, online loan application, and credit scoring that uses technology.
3. Barriers and Enablers - barriers include digital literacy, infrastructure, trust in technology, transaction costs, and policy incentives.
4. The former constructs are operationalized into measurable variables using survey items that have been previously developed on the basis of the literature (Mishra and Sahoo, 2021; Arner, Barberis, and Buckley, 2016).

4.6. Analytical Tools

There is the data analysis that is descriptive and inferential. Respondents are profiled through the use of descriptive statistics (frequency distributions, percentages and mean scores), which are used to summarize patterns of finance and technology use. The correlation analysis will be used to examine the preliminary relationships between institutional finance and FinTech adoption. All the hypotheses are tested using regression and logistic regression models to determine determinants of FinTech adoption and test the hypothesis about the impact of institutional finance and socio-economic determinants. Furthermore, factor analysis is used to categorise related variables, and to determine the latent constructs especially in the case of barriers and enablers. Such an assortment of approaches is a guarantee of the strong and effective analysis of the research problem (Gujarati and Porter, 2009).

Results and Discussion

5. 1. Profile of Respondents

A sample of 210 agri-business enterprises was surveyed in Bengaluru Rural District including farmers producer organizations (FPOs), small medium enterprises (SMEs) and others.

individual agri-enterprises. The demographic and business features of the respondents are provided in Table 1.

Table 1: Profile of Respondents (SPSS Output Format)

Variable	Category	Frequency (n)	Percentage (%)
Enterprise Type	Individual Enterprises	98	46.7
	SMEs	65	31
	FPOs	47	22.3
Sector Focus	Crop-based	102	48.6
	Dairy/Livestock	63	30
	Processing/Agri-inputs	45	21.4
Gender of Entrepreneur	Male	156	74.3

	Female	54	25.7
Years of Operation	< 5 years	89	42.4
	5–10 years	73	34.8
	> 10 years	48	22.8

The distribution of the profile shows that majority of the enterprises owned by males and dependent on crops but one-fourth is made up of women owned enterprises. The age of most of the firms (less than 10 years) indicated the increased entrepreneurship going on in the district.

5.2. Institutional Finance Patterns

Table 2 gives a summary of the key sources and issues of institutional finance.

Table 2: Access to Institutional Finance

Parameter	Mean Score (1–5 Likert)	Std. Deviation
Ease of Bank Loan Access	2.78	0.91
Adequacy of Loan Amount	2.94	0.87
Interest Rate Affordability	2.65	0.93
Collateral Requirements Burden	3.42	1.02
Timeliness of Loan Disbursement	2.81	0.89

The results indicate that although there was partial access to formal credit by the enterprises, collateral requirements, and turnaround within the disbursement became significant constraints. This aligns with past research demonstrating how strict banking standards are disproportionately hurting enterprises that are led by smallholders (NABARD, 2022).

5.3. Extent of FinTech Adoption

The behavior observed in the use of FinTech in enterprises was measured based on indicators of mobile banking, digital payments, e-wallets, loan applications, and agri-market applications.

Table 3: FinTech Adoption among Agri-Business Enterprises

FinTech Service Used	Adoption Rate (%)
Mobile Banking (UPI, IMPS)	76.2
Digital Payments (POS/QR)	68.5
E-Wallets	52.8
Loan Apps/Digital Credit	38.1
Agri-Market Platforms	44.3

The statistics indicate that mobile banking and digital payments have high penetration whereas loan applications and agri-market platforms are not used. Interviews have shown that the lack of digital literacy and concern about the trust are the barriers to wider adoption, which resonate with the results worldwide (World Bank, 2021).

5.4. Impact Analysis

5.4.1. Institutional Finance and FinTech Adoption

The hypothesis that the availability of institutional finance has a positive effect on the adoption of FinTech was tested using regression analysis.

Table 4: Regression Analysis – Institutional Finance and FinTech Adoption

Predictor Variable	Beta (β)	t-value	Sig. (p)
Institutional Finance Score	0.312	3.92	0.000***

Enterprise Size	0.218	2.67	0.008**
Gender of Entrepreneur	0.091	1.21	0.227
$R^2 = 0.28$, $F = 12.35$, $p < 0.001$			

***p < 0.01, **p < 0.05

The findings indicate that institutional finance access and FinTech adoption have a positive and significant relationship, which confirms H1. Greater adoption was also documented in larger businesses and gender was not significant.

5.4.2. Effect of FinTech on Financial Performance

Correlation and regression models were also executed with regard to FinTech adoption scores versus financial performance indices (sales growth, profitability, market linkages) in order to test H2.

Table 5: Correlation between FinTech Adoption and Financial Performance

Variable	Sales Growth	Profitability	Market Linkages
FinTech Adoption Score	0.421**	0.385**	0.468**

**p < 0.01

The results are positive and significant correlations, meaning that the adoption of FinTech improves financial access, efficiency, and connectivity to the market. It confirms H2 and is similar to the results of China and Kenya where FinTech platforms increased reach to rural businesses (Zhang and Yu, 2020; Gikandi and Bloor, 2019).

5.5. Comparisons by Enterprise Type and Gender

Type of Enterprise: FPOs also had better collective bargaining in FinTech platforms than individual enterprises.

Gender: Female entrepreneurs stated that they were more dependent on digital payment, but their tendency to use digital loan apps was lower, which is an indicator of digital literacy gaps.

Discussion

The findings prove that institutional finance and FinTech are not substitutes, but complementary, in the growth of agri-business in Bengaluru Rural. Although banks have still been the source of the capital base, FinTech solutions are covering the efficiency of the transactions, the speed of access, and market connections. Yet, such obstacles as digital literacy, trust and infrastructure gaps remain.

Such results can be traced back to previous literature, which emphasized the obstacles in rural credit (Mishra and Sam, 2021) and can be aligned with the evidence regarding the transformative potential of FinTech in rural economies (World Bank, 2021). Notably, the research brings an empirical view on a district level, which fills the gap between the discourse on national policy and the realities on the ground.

Challenges and Policy Implications

The combination of institutional finance and the new FinTech solutions has unlimited opportunities to change agri-business businesses in Bengaluru Rural. However, the transition is far from seamless. A number of structural, technological and socio-cultural obstacles are still present to limit the full use of digital finance. Meanwhile, it is possible to close these gaps with the help of proactive policy interventions and innovative partnerships.

6.1. Key Challenges

The paper has found that there are several difficulties of agri-business enterprises accessing and using FinTech services.

Table 6: Challenges in Integrating FinTech with Institutional Finance

Challenge	Frequency	Percentage (%)	Rank
Digital divide (poor connectivity, lack of devices)	122	61	1
Low financial literacy and digital awareness	110	55	2
Trust deficit in digital platforms	89	44.5	3
Regulatory hurdles and compliance issues	72	36	4
Cybersecurity and fraud risks	67	33.5	5

Source: Primary survey, 2025 (SPSS frequency analysis)

The findings show that the most urgent one is the digital divide, as more than 60% of the interviewees cited a lack of connection to the internet or lack of smartphones. It is in line with the previous literature which has pointed out that the rural infrastructure usually limits the growth of digital finance (Chowdhury et al., 2021). Equally, the lack of financial literacy also prevents the users to effectively utilize mobile banking and e-wallet services (Demirguc-Kunt et al., 2018).

Another issue was mistrust in technology. The fear of fraud is another reason why respondents are reluctant to switch to app-based transaction, which is also supported by the results of Singh and Sharma (2020) who report that cybersecurity inhibits the adoption rate in rural India. Also cited as obstacles to smaller enterprises and farmer-producer organizations (FPOs) were regulatory and compliance-related barriers, especially Know Your Customer (KYC).

Opportunities for Growth

Nevertheless, FinTech also has revolutionary opportunities in the rural finance.

Table 7: Perceived Opportunities of FinTech Adoption

Opportunity	Mean	Std. Dev.	Rank
Partnerships between banks, FinTechs, and FPOs	4.31	0.72	1
Government initiatives (UPI, KCC digitization, PMFBY)	4.12	0.8	2
Access to wider markets through digital platforms	4.08	0.76	3
Reduction in transaction costs and time	3.95	0.81	4
Improved transparency and record-keeping	3.89	0.79	5

The findings show that the respondents are extremely positive about the idea of a collaborative partnership, in which institutional banks, FinTech startups, and farmer collectives may collaboratively provide financial solutions. Digital projects initiated by the government, including the Unified Payments Interface (UPI), the Pradhan Mantri Fasal Bima Yojana (PMFBY), the digitalization of Kisan Credit Cards were also cited as the major enablers. These results are consistent with the evidence at the international level, in which state-supported digital ecosystems helped to considerably boost the uptake of FinTech (Jack and Suri, 2016; Narula and Singh, 2022).

Policy Implications

A multi-pronged policy is necessary to realize the potential of FinTech in the financial services of agri-business:

1. Bridging the Digital Divide: The focus should be on the investment in internet infrastructure in rural areas and the affordable smartphone initiatives. One of the key aspects of the digital inclusivity can be focused on the public-private partnership.
2. Increasing Financial and Digital Literacy: Organized educative approaches via Krishi Vigyan Kendra (KVKs), self-help groups, and FPOs may empower entrepreneurs to apply the mobile wallets, loan applications, and e-market apps better.
3. Facebook and Trust: To enable trust building, regulating bodies and FinTech companies should adopt strict cybersecurity measures, open Grievance redressal measures, and digital fraud insurance.
4. Policy Harmonization: FPOs and an improved financial access to small businesses: Revised KYC requirements to accommodate small enterprises and FPOs, coupled with the interoperability of digital platforms.
5. Developing Collaborative Ecosystems: Banks, FinTech companies, and agricultural cooperatives have to collaboratively create products that can be adapted to agri-businesses, such as credit scoring models based on crop yield and history of digital payment.

Through this, institutional finance and FinTech can co-exist instead of rival each other, which will allow inclusive development of agri-business enterprises in Bengaluru Rural.

Conclusion

The current research examined the interactions between institutional finance and adoption of FinTech with agri-business ventures in Bengaluru Rural District. The results indicate that institutional finance still remains very important in facilitating growth, yet its availability is still uneven as a result of collateral condition and excessive transaction costs. Simultaneously, FinTech solutions, namely, mobile banking, digital payments, and agri-market platforms, are becoming more widely used as the auxiliary tool to enhance financial access and efficiency.

- **Contributions to Literature and Practice**

The paper fits into the emerging research on the topic of digital financial inclusion by illustrating the interaction between FinTech adoption and traditional institutional finance in a rural agri-business setting (Ozili, 2023; Demirguc-Kunt et al., 2022). In practice, the findings highlight the importance of integrated models, in which banks and FinTech platforms cooperate in terms of increasing access, efficiency and trust among rural entrepreneurs.

- **Limitations**

The study is restrictive because it is geographically restricted to Bengaluru Rural District and this does not allow one to generalize the results to other regions of India. The cross-sectional study also does not allow the monitoring of the long-term effects. In addition, the small sample size ($n = 120$) cannot be deemed to measure all the different variations in agri-business financing behaviour.

• **Scope for Future Research**

Further investigation may involve comparison by district and state, analyzing different patterns of adoption of FinTech in diverse socio-economic conditions. The longitudinal study can also determine the effect of sustained use of FinTech on the profitability of enterprises and the long-term economic sustainability in the rural areas.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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